[*a*, Nest of the Fuliginous Ant; *b*, Formica fuliginosa; *c*, Yellow Ant (Formica flava); *d*, Fallow Ant (Formica rufa); *e*, Nest of the Common Yellow Ant—built over the margin of a streamlet—observed by S. S.; *f*, Formica emarginata; *g*, Formica ligniperda.]

CURIOSITIES OF BRITISH NATURAL HISTORY.

Ants.

It was said by one of old, "Go to the ant,—consider her ways;" and truly there is much in the economy of these insects to astonish and please. In many respects ants resemble bees and wasps in their habits, living in societies composed of thousands of individuals, establishing colonies, and conducting the various operations necessary to the well-being of the settlement with diligence and order. The interior of an ants'-nest is a busy scene—all is animation; and when rudely opened, the anxiety manifested with respect to the safety of the larvæ, or young, which the insects carry about in their mandibles, seeking a place of retreat, is very apparent.

The inhabitants of an ants'-nest consist of males, females, and workers, besides eggs, larvæ, and pupæ. The males and females have at first, when they emerge from the pupa state, four delicate transparent wings; the workers, or neuters, which are really imperfect females, never have wings. In some species the neuters are of two dimensions, some greatly exceeding the others in bulk, as in Formica rufa and F. flava, but no difference has been discovered in the labours which devolve upon them. They defend the community, they nurse and feed the larvæ, they forage for provisions, they form roads, build and repair the nest or formicary, they guard the queens, and attend to their wants, and in some cases they assemble for the purpose of carrying on a warfare against the tenants of other settlements. But before we enter into a detail of the operations of these curious insects, let us glance at their nests or cities, which are more ingeniously constructed than might on a cursory glance be supposed.

The turf-ant (Formica cæspitum), a very small dusky-brown species, common in gardens and fields, is usually found to select a tuft of herbage, or long grass, the stems of which serve to support the dome-like top and walls, while the blades spread over it. The structure of this tenement is very slight, and consists of small grains of earth, piled up without any other cement than water, or the dew or moisture of the ground, which produces a sufficient degree of adhesion between the particles; we have seen it made almost wholly of grains of sand, which are so skilfully

arranged as to retain their position. Internally are galleries and various chambers. Often this species hollows out galleries and chambers beneath stones.

The yellow ant (Formica flava) uses the dust of decayed wood, or particles which it gnaws from mouldering logs or trees, and mixes this material by means of its mandibles with earth and spiders' webs, thus forming it into a sort of rude papier-mâché, with which it builds the stages, chambers, and galleries of its edifice.

The nest of the fallow-ant, horse-ant, or wood-ant (Formica rufa), the largest of our British species, and which is common in woods and pleasure-grounds, presents a very rude appearance; externally it appears nothing more than a hillock of sand, earth, bits of wood, dried particles of leaves, bits of twigs, and even grains of corn, all confusedly jumbled together and forming a mass of considerable size. Internally it contains numerous chambers, arranged in separate stories, some of which are deep in the earth, which the colony has excavated; others in the centre, and even near the surface of the hillock, and communicating with each other by means of galleries; while other passages lead to the outside, the doors of which are kept shut or open according to the state of the weather, but are always closed up at night. The brown ants (F. fusca) make storied habitations of clay, in the raising of which they show equal ingenuity and industry.

The societies of the fuliginous or jet ant (Formica fuliginosa) make their habitations in the trunks of old oaks or willows, in which, with their strong mandibles, they work out horizontal galleries, separated from each other by thin partitions, and communicating with each other; sometimes these galleries appear like halls supported by rows of pillars. Of these pillared halls, story rises above story, presenting a delicate and elaborate specimen of carved-work, stained black, but whether in consequence of the exposure of the wood to the atmosphere, of some emanation from the ants, or the action of formic acid (a peculiar acid secretion found in these insects *), is not apparent.

Did space allow, we might here enlarge upon the wonderful structures made by ants in the warmer portions of the globe, and which have attracted the notice of travellers. Malouet saw in Guiana ant-hills from fifteen to twenty feet in height, and from thirty to forty feet in circumference at the base, of a pyramidal figure, but was deterred from approaching them within forty paces, by the fear of being devoured. Stedman, when in Surinam, passed an ants'-nest six feet in height, and one hundred in circumference. Mr. Darwin says, "A person on first entering a tropical forest (in South America) is astonished at the labours of the ants; well-beaten paths branch off in every direction, on which an army of never-failing foragers may be seen, some going forth, others returning burdened with pieces of green leaf often larger than their own bodies." It is perhaps of the same species that Dampier speaks, when he describes a small yellow ant of South America, whose sting is like a spark of fire, and which makes nests in great trees, placed on the body between the large bifurcations, often equalling a hogshead in size: these nests are their winter retreats. Great paths through the woods, of the breadth of four inches, are trodden by them, and thousands may be seen returning laden with portions of green leaf, so large that he could scarcely see the insect for its burden: the path looked a moving line of green. In Australia a species of ant builds a curious nest in the trees by bending down several adjacent leaves, and glueing them together so as to form a purse. "Their method of first bending down the leaves," says Hawkesworth, in his account of Cook's first voyage, "we had no opportunity to observe, but we saw thousands uniting all their strength to hold them in this position, while other busy multitudes were employed within in applying the gluten that was to prevent their returning back. To satisfy ourselves that the leaves were bent and held down by the efforts of these diminutive artificers, we disturbed them in their work; and as soon as they were driven from their stations, the leaves on which they were employed sprang up with a force much greater than we could have thought them able to conquer by any combination of their strength: but though we gratified our curiosity at their expense, the injury did not go unrevenged, for thousands immediately threw themselves upon us, and gave us intolerable pain with their stings, especially those which took possession of our necks and hair, whence they were not easily driven."

The same writer describes a black species of New South Wales, which excavates the branches of trees by working out the pith almost to the extremity of the slenderest twig, the tree at the same time flourishing as if it had no such inmates. On breaking off a branch, the travellers were instantly covered with thousands of those insects, which inflicted their stings with incessant violence. Other species make huge nests of clay in the trees, conspicuous at a great distance.

But we must return to our immediate subject. In the month of August or September, if an ant's nest be watched some glowing day, thousands of winged ants will be seen issuing forth, rising in the air with a slow movement, settling on gates, stones, posts, &c. These are the males and females which have just emerged from the pupa state, and attained their complete development. The clouds of these which are sometimes seen are astonishing: the swarms of a whole district seem to assemble together, and rise in the air like columns of vapour, whirling and twisting about as the living myriads composing the mass change their position. Various instances of this extraordinary swarming of ants are on record. Messrs. Kirby and Spence say "that when Colonel Sir Augustus Frazer, of the Horse Artillery, was surveying, on the 6th of October, 1813, the scene of the battle of the Pyrenees from the summit of the mountain Pena de Aya, or Les Quatres Couronnes, he and his friends were enveloped in a swarm of ants so numerous as entirely to intercept their view, so that they were glad to remove to another station to get rid of them." Mr. Gleditsch, in the 'History of the Berlin Academy' for 1749, describes swarms of a small black ant which appeared in Germany, and formed high columns in the air, rising to a vast height, and agitated with a curious intestine motion somewhat resembling the aurora borealis. We might add numerous other instances: we have ourselves, on more than one occasion, seen immense swarms. It is now that the males and females pair, and were it not for the destruction that takes place, greatly reducing the numbers of the females, ants would be one of the pests of mankind; as it is, in some countries they are sufficiently obnoxious. Birds prey upon them; millions perish in rivers, ponds, and lakes, and are snapped up by various fishes. With respect to the males, they all perish; the end of their existence is accomplished; and they have neither sting for defence nor strong jaws for needful labour and the acquisition of food. All the females, which are easily known by their size and the expansion of their wings, and all the males, do not leave the original nest; or if they do, the workers scatter themselves abroad in quest of fertile females, and taking them prisoners, re-conduct them to the nest, dragging them along by force, and vigilantly guarding them lest they

* Messrs. Kirby and Spence say that Fourcroy and Vauquelin have ascertained that the acid of ants is a mixture of the acetic and malic. It is very copious and pungent.

should escape, which they seem always disposed to do. In a short time they lose their wings, which, no longer needed, fall off, or, as Huber affirms, are purposely plucked off; and the process of laying the eggs commences. Numerous females, however, escape, and become the founders of distinct colonies: they lose or tear away their wings, begin to construct a cell, lay their eggs, and soon are accompanied by a crowd of workers. Solitary females may be often discovered thus engaged.

With respect to imprisoned females, of which there are sometimes several in a single nest, they are attended each by a worker, who supplies their wants: they exhibit no rivalry, but crowds follow in their train; and when they lay their eggs, these are taken by the workers and arranged in the cell she is at the time occupying. According to Huber, when a female is acknowledged as a parent, the workers begin to pay her homage, very similar to that which the bees render their queen: they press round her, offer her food, conduct her by her mandibles through the labyrinthine galleries, and carry her over the steep or difficult passages, while she coils herself round, so as to incommode her bearers as little as possible. "In whatever apartment," says Mr. W. Gould ('Account of English Ants,' 747), "a queen condescends to be present, she commands obedience and respect. A universal gladness spreads itself through the whole cell, which is expressed by particular acts of joy and exultation: they have a peculiar way of skipping, leaping, standing on their hind legs, and prancing with the others. These frolics they make use of both to congratulate each other when they meet, and show their regard for the queen; some of them gently walk over her, some of them dance round her: she is generally encircled by a cluster of attendants, who, if you separate them from her, soon collect themselves into a body, and inclose her in the midst." Huber says that even if she dies, they sometimes continue for months the same attentions to her,—brush her, lick her, and treat her with the same courtly formality as if she were alive.

[To be continued.]

USES OF THE CHESTNUT-TREE.

The name *chestnut* has been applied to two trees differing considerably in their character; the one being included by botanists under the order Corylaceæ, and the other under the order Æsculaceæ. The first yields the *sweet chestnuts*, eaten as fruit; while the other yields what are termed 'horse-chestnuts;" which name seems to have been given because the form and colour of the nuts are somewhat similar to those of the sweet chestnut, and because they are said to be used in some countries as a horse-medicine. The uses of these two trees are principally in relation to the wood and the nut; but there are a few others which may deserve a brief notice.

In most countries the sweet chestnut-tree is cultivated more for its fruit than any other product. The tree attains a height of from sixty to eighty feet in fifty or sixty years; before which period its timber is generally in the highest state of perfection; but the tree will live for a very long period afterwards, although its timber, unlike that of the oak, deteriorates as it grows older, becoming decayed and brittle. There is a chestnut-tree at Tortworth which is supposed to have been planted before the Norman conquest; but its timber would probably be found almost valueless.

From the property of chestnut-wood, of being more durable when young than when old, it is very valuable for posts, fencing-poles, stakes, hoops, &c.; the sap or outer wood very soon changing into heart-wood. Much mistake has arisen from a certain resemblance which chestnut-wood bears to oak under some circumstances. A belief long and generally prevailed, and partially exists at present, that the roofing and main beams of many of our ancient buildings and houses were formed of the chestnut; but repeated and careful examinations have shown that in most, if not all such instances, the timber of the oak, and chiefly of the sessile-fruited kind, has been mistaken for chestnut. Mr. Selby remarks that "the wood of the oak, more particularly that of the sessile-fruited variety, assumes in course of time a near resemblance in colour to that of the chestnut in its best condition, or when young and untainted at heart; and as few chestnuts could have acquired the scantling frequently observed in the timbers of these ancient buildings at the age when decay almost invariably commences, this, in fact, furnishes a strong argument against the use of chestnut timbers and beams by our ancestors, inasmuch as the trees must have become unfit for the purpose long before they had attained the necessary dimensions." According to Mr. Loudon, the two kinds of timber may be distinguished by the transverse fibres of the chestnut being more confused, and much less evident to the naked eye, than those of the oak; so that, to ascertain whether a plank of timber is oak or chestnut, it is only necessary to saw off a thin slice at one of its extremities.

From some peculiarities in its growth the chestnut trunk is apt to become rent with fissures proceeding from the centre to the circumference; and this circumstance renders the wood more fitted for laths or fencing than for beams or planks. Chestnut-wood is stated by some French writers to be much used for making wine-casks; the wine being said to ferment more slowly, to evaporate less rapidly, and to contract less unpleasant taste from the wood, than in casks made of any other kind of wood. Allusion is made in a French poem to

> "Close-grain'd chestnut, wood of sov'reign use
> For casking up the grape's most powerful juice."

Chestnut-wood makes capital hoops, from a property which it seems to possess of resisting the dry-rot in cellars, where other woods are likely to decay. At La Bresse, in France, posts of chestnut are preferred to those of every other wood for forming the supports of huts.

Evelyn speaks thus of the timber:—"The chestnut is, next the oak, one of the most sought after by the carpenter and joiner. It hath formerly built a good part of our ancient houses in the City of London, as does yet appear. I had once a very large barn next the City, framed entirely of this timber; and, certainly, the trees grew not far off, probably in some wood near the town; for in the description of London written by Fitz-Stephen, in the reign of Henry II., he speaks of a very noble and large forest which grew on the boreal part of it, and which was well stored with all sorts of good timber." Mr. Loudon remarks on this passage, that Evelyn evidently here fell into the common error of confounding the chestnut with the oak. Other parts of Evelyn's description are quaint enough:—"If the timber be dipped in scalding oil, and well pitched, it becomes extremely durable; but otherwise, I cannot celebrate the tree for its sincerity, it being found that, contrary to the oak, it will make a fair show outwardly, when it is all decayed and rotten within; but this is in some sort recompensed, if it be true that the beams made of chestnut-tree have this property—that, being somewhat brittle, they give warning, and premonish the danger by a certain crackling; so as, it is said, to have frighted those out of the baths at Antandro, whose roof was laid with

this material, but which, Pliny says, was of hazel, very unlike it."

Mr. Loudon quotes, one by one, the opinions expressed by various writers as to beams of ancient buildings being formed of chestnut. Evelyn, Cook, Miller, Marshall, Gilbert White, Pontey, Mitchell, and Mathew —all English writers who have at different times described chestnut timber—appear to have fallen into the opinion which is now regarded as an error. The real excellence of chestnut-wood seems to be indicated in the following remarks by Mr. Kent, who communicated his opinions some years ago to the Society of Arts:—"The branch or limb of a chestnut, about thirteen inches square, which in the year 1726 was put down as a hanging-post for a gate, carried the gate without alteration fifty-two years; when, upon altering the enclosures of the farm where it stood, it was taken up under my direction, and appearing to be perfectly sound, was put down for a clapping-post in another place. In 1743 a large barn was built with some of this timber, and is now (1792) as sound in every part, beams, principals, and spars, as when first the barn was built. About the same time several chestnut posts and rails were put down, which I have since seen removed; and after standing thirty or forty years, they generally appeared so sound as to admit of being set up in some other place. The last instance I shall mention, though not of long date, will show the great superiority of this timber over oak in fences. In the year 1772 the present Mr. Windham made a large plantation in his park, which was fenced with posts and rails, converted from young oaks and chestnuts of the same age and scantling, such as were picked out of a place where they stood too thick. Last year, upon Mr. Windham's enlarging this plantation, it was necessary to remove this fence; when the chestnut-posts were found as sound as when they were first put down, but the oak were so much wasted just below the surface of the ground, that they could not be used for the same purpose again without the assistance of a spur to support them."

The fruit of the chestnut is well known in most European countries. In England they are eaten raw, roasted, stewed with cream, made into soup either with milk or gravy, stewed with salt-fish, or used as a stuffing for fowls and turkey; though the first two modes are most common. Evelyn, after reproaching Englishmen for giving "to our swine that which is amongst the delicacies of princes in other countries," speaks of the chestnut as "a lusty and masculine food for rustics at all times, and of better nourishment for husbandmen than cale and rusty bacon; yea, or beans to boot." He recommends them to be dressed in the various ways which "our French cooks teach us," as he considers them to be the parent of many disorders when eaten raw.

It is on the Continent, however, that the fruit of the chestnut is made most available as an article of food. In the south of France and the north of Italy, it serves in a great measure as a substitute for bread and potatoes. As a means of preserving the chestnuts during winter, great care is taken to gather and dry them. When the nuts are ripe, those that are to be preserved are collected every day from the ground on which they have fallen from the trees, and spread out on a dry airy place till the whole are gathered together. Those which remain on the trees are knocked off by means of long poles. The nuts laid by for winter vegetable are those which fall off the trees; while those which are beaten off are carried to Paris, or to the local markets, for immediate use. As a means of depriving the nuts of their husks, they are trodden under foot by men wearing 'sabots' or wooden shoes; or if the nuts are to be preserved for a short time, they are kept in their husks, either in barrels of sand or in heaps in the open air.

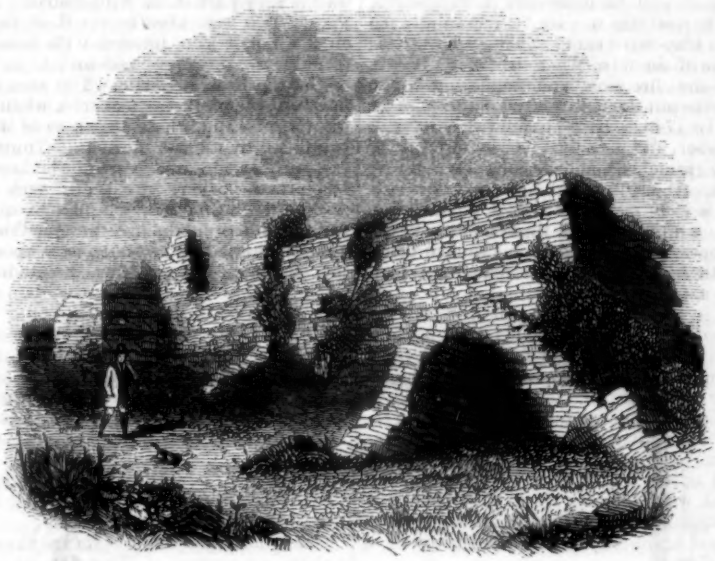
Mr. Loudon state the modes of using the chestnut in France to be as follows:—One of the modes of drying the nuts in order to preserve them for several years, is to place those which have been collected from the ground on coarse riddles, sieves, or hurdles, in a dry airy place, and afterwards to expose them to the sun; or to boil them for a quarter of an hour, and then dry them in an oven. In Limousin and Perigord, where the chestnut-flour is used for making the kind of cake called *la galette*, and the thick porridge called *la polenta*, which are the common food of the peasantry, the chestnuts are dried with smoke. A thin layer of nuts, which have been deprived of their husk, is laid on a kind of kiln pierced with holes; and a fire is made below with the husks and a part of the wood of the tree, which is permitted to smoulder, but not to burst into flame. In a short time the superabundant moisture oozes through the skins of the nuts; and the fire being then extinguished, the nuts are allowed to remain till cold. They are then thrown on one side, and a fresh layer is spread out, and subjected to the same process. When a sufficient quantity of chestnuts is thus prepared, to cover the floor of the kiln to a depth of one foot, they are laid upon it, and a gentle fire is made below, which is gradually augmented during two or three days, and is then continued during nine or ten days, the chestnuts being regularly turned till the nuts part readily from their skins. They are then put into sacks, which have been previously wetted, and threshed with sticks, or rubbed upon a large bench or table; after which they are winnowed, and are then ready for the mill. During the process of drying, the fire is watched night and day; and the under side of the floor of the kiln is frequently swept from the soot. The dust which results from the winnowing of the nuts, as well as the broken nuts, are used for feeding cattle.

The *galette* and the *polenta* are thus prepared:—The galette is a species of thick flat cake, made from the chestnut-flour, which flour, if kept in casks or in corked earthen bottles, will remain good for years. The cake is made without yeast, but contains milk and a little salt, and sometimes eggs and butter. It is baked either on an iron plate or on a hot flat stone. The *polenta* is made by boiling the chestnut-flour in water or milk, and continually stirring it, till it has become quite thick, and will no longer stick to the fingers. When made with water, it is frequently eaten with milk, in the manner of Scotch oatmeal 'parritch.' Another dish, called *chatigna*, is made by boiling the entire chestnuts, after they have been dried and freed from their skins, in water with a little salt, till they become soft, and then breaking and mixing them together like mashed potatoes. A sweetmeat, called *marrow glace*, is made by dipping the nuts into clarified sugar, and then drying them, producing a 'bon-bon' analogous to sugared almonds. The nuts are frequently cooked in France by boiling them in water containing the leaves of celery, sage, or any other flavouring herb. In Evelyn's time chestnuts appear to have been eaten as a luxury, in combination with wine, sugar, juice of lemon, fennel, cinnamon, nutmeg, rose-water, and various other delicacies, one or other of which was combined in various ways with the chestnuts.

Twenty thousand bushels of chestnuts are annually imported into England from Spain; whence they are generally known in this country as 'Spanish' chestnuts.

As respects the *horse-chestnut*, a very few details will suffice. The timber is not very strong or durable, but it is used as boards for flooring, cart-linings,

packing-cases, &c.; for sabots, or wooden shoes; and for water-pipes. When burned, the charcoal is sometimes used in gunpowder-making; and the ashes afford a considerable quantity of potash. The bark is occasionally used for tanning, for dyeing yellow, and as a medicinal substitute for Jesuits' bark. The nuts in Turkey are ground and mixed with horse-food; and in their natural state they are eaten by goats, sheep, and deer. They possess a detergent quality, and serve in some degree as soap. They are used in Ireland to whiten flaxen cloth, and for this purpose are rasped into water, when they are allowed to macerate for some time. When ground into flour, and mixed in the proportion of one-third with wheat-flour, they are said to add to the strength of book-binders' paste. It has been proposed in France to extract a starch from the nut, to ferment this starch into sugar, and thence to produce spirit; but we do not know whether this has ever been done, though the fruit of the real or Spanish chestnut has been made to yield sugar, in greater proportion, it is said, than from beet-root.



[North Wall of Richborough.]

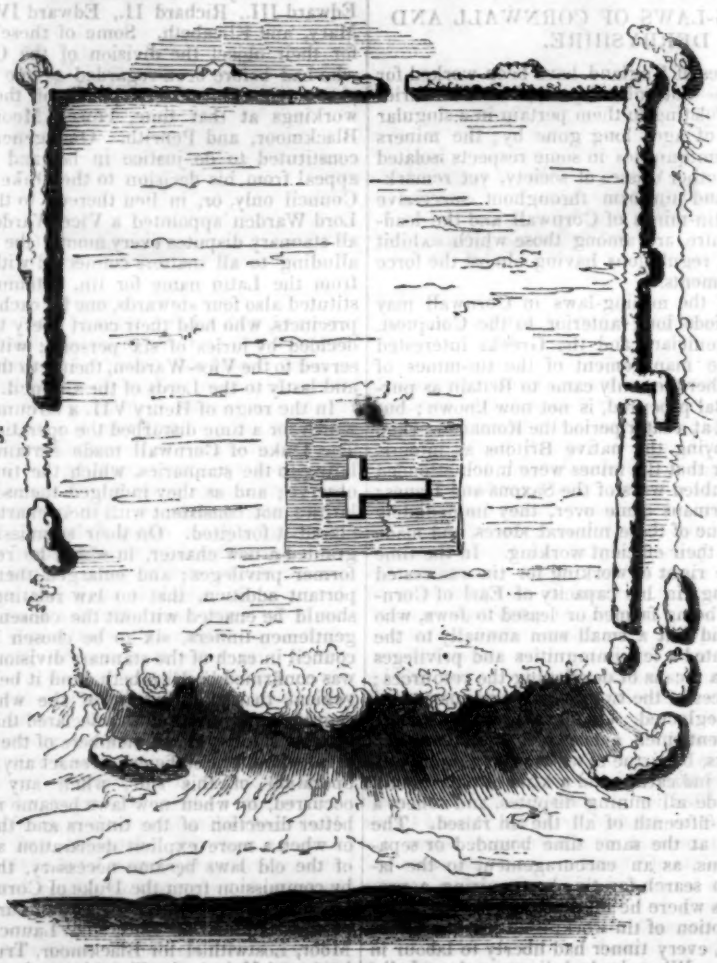
RICHBOROUGH AND RECULVER.

[From 'Old England.']

It was a little before the commencement of a glorious corn-harvest that we first saw Richborough. Descending from the high fertile land of the Isle of Thanet, we passed Ebbefleet, the spot in Pegwell Bay where tradition says Hengist and Horsa landed, to carry war and rapine into the country. The coast here wears an aspect of melancholy dreariness. To the east we looked back upon the bold cliff of Ramsgate; to the west, upon the noble promontory of the South Foreland. But all the land space between these two extremities of the bay is a vast flat, drained in every direction by broad ditches, amidst which, in propitious seasons, thousands of sheep find a luxuriant though coarse pasture. At low-water the sea retires many furlongs from this flat shore; and then, the fisher-boy fills his basket with curious shells, which are here found in great variety. When the tide has ebbed, a narrow stream may be traced for a long distance through the sand, which, when the salt wave has receded, still fills the little channel into which it empties itself from its inland source. This is the river Stour, whose main branch, flowing from Ashford by the old Roman Castle of Chilham, and onward to Canterbury, forms the boundary of the Isle of Thanet on the south-west; and making a sudden bend southerly to Sandwich, returns again in a northerly direction to empty itself into its sea-channel in Pegwell Bay. The road crosses the peninsula which is formed by this doubling of the river. At about a mile to the west is a gentle hill crowned with a large mass of low wall. At the distance of two or three miles we distinctly see that this is some remarkable object. It is not a lofty castle of the middle ages, such as we sometimes look upon, with tower and bastion crumbling into picturesque ruin; but here, on the north side, is a long line of wall, without a single aperture, devoid alike of loophole or battlement, and seemingly standing there only to support the broad masses of ivy which spread over its surface in singular luxuriance. We take boat at a little ferry-house, at a place called Saltpans. Leland, when he went to Richborough three hundred years ago, found a hermit there; and he says, "I had antiquities of the heremite, the which is an industrious man." So say we of the ferry-man. He has small copper coins in abundance, which tell what people have been hereabout. He rows us down the little river for about three-quarters of a mile, and we are under the walls of Richborough Castle. This is indeed a mighty monument of ages that are gone. Let us examine it with somewhat more than common attention.

Ascending the narrow road which passes the cottage built at the foot of the bank, we reach some masses of wall which lie below the regular line (See the Plan). Have these fallen from their original position, or do they form an outwork connected with fragments which also appear on the lower level of the slope? This is a question not very easy to decide from the appearance of the walls themselves. Another question arises, upon which antiquarian writers have greatly differed. Was there a fourth wall on the south-eastern side facing the river? It is believed by some that there was such a

wall, and that the castle or camp once formed a regular parallelogram. It is difficult to reconcile this belief with the fact that the sea has been constantly retiring from Richborough, and that the little river was undoubtedly once a noble estuary. Bede, who wrote his 'Ecclesiastical History' in the beginning of the eighth century, thus describes the branch of the river which forms the Isle of Thanet, and which now runs a petty brook from Richborough to Reculver: "On the east side of Kent is the Isle of Thanet, considerably large, that is, containing, according to the English way of reckoning, six hundred families, divided from the other land by the river Wantsum, which is about three furlongs over, and fordable only in two places, for both ends of it run into the sea." Passing by the fragments of which we have spoken, we are under the north (strictly north-east) wall,—a wondrous work, calculated to impress us with a conviction that the people who built it were not the petty labourers of an hour, who were contented with temporary defences and frail resting-places. The outer works upon the southern cliff of Dover, which were run up during the war with Napoleon at a prodigious expense, are crumbling and perishing, through the weakness of job and contract, which could not endure for half a century. And here stand the walls of Richborough, as they have stood for eighteen hundred years, from twenty to thirty feet high, in some places with foundations five feet below the earth, eleven or twelve feet thick at the base, with their outer masonry in many parts as perfect as at the hour when their courses of tiles and stones were first laid in beautiful regularity. The northern wall is five hundred and sixty feet in length. From the eastern end, for more than two-fifths of its whole length, it presents a surface almost wholly unbroken. It exhibits seven courses of stone, each course about four feet thick, and the courses separated each from the other by a double line of red or yellow tiles, each tile being about an inch and a half in thickness. The entrance to the camp through this north wall is very perfect, of the construction marked in the Plan. This was called by the Romans the Porta Principalis, but in after times the Postern-gate. We pass through this entrance, and we are at once in the interior of the Roman Castle. The area within the walls is a field of five acres, covered, when we saw it, with luxuriant beans, whose green pods were scarcely yet shrivelled by the summer sun. Towards the centre of the field, a little to the east of the postern-gate, was a large space where the beans grew not. The area within the walls is much higher in most places than the ground without; and therefore the walls present a far more imposing appearance on their outer side. As we pass along the north wall to its western extremity,



[Plan of Richborough.]

it becomes much more broken and dilapidated; large fragments having fallen from the top, which now presents a very irregular line. It is considered that at the north-west and south-west angles there were circular towers. The west wall is very much broken down; and it is held that at the opening (see the Plan) was the Decuman gate (the gate through which ten men could march abreast). The south wall is considerably dilapidated; and from the nature of the ground is at present of much less length than the north wall. Immense cavities present themselves in this wall, in which the farmer deposits his ploughs and harrows, and the wandering gipsy seeks shelter from the driving north-east rain. One of these cavities in the south wall is forty-two feet long, as we roughly measured it, and about five feet in height. The wall is in some places completely pierced through; so that here is a long low arch, with fifteen or eighteen feet of solid work, ten feet thick, above it, held up almost entirely by the lateral cohesion. Nothing can be a greater proof of the extraordinary solidity of the original work. From some very careful engravings of the external sides of the walls, given in King's 'Munimenta Antiqua,' we find that the same cavity was to be seen in 1775.

[To be continued.]

THE MINING-LAWS OF CORNWALL AND DERBYSHIRE.

Some of the mines of England have been worked for such a long series—not only of years, but of centuries—that the laws relating to them pertain in a singular manner to those of ages long gone by; the miners having formed communities in some respects isolated and distinct from other classes of society, yet remarkably consistent and uniform throughout successive centuries. The tin-mines of Cornwall and the lead-mines of Derbyshire are among those which exhibit instances of local regulations having almost the force of statutary enactments.

The growth of the mining-laws in Cornwall may be traced to periods long anterior to the Conquest. Whether the Phœnicians and the Greeks interested themselves in the management of the tin-mines of Cornwall, or whether they only came to Britain as purchasers of the metal procured, is not now known; but it is supposed that at a later period the Romans worked the mines, employing the native Britons as miners. It does not appear that the mines were much attended to during the troubled wars of the Saxons and Danes; but when the Normans came over, they immediately perceived the value of these mineral stores, and made arrangements for their efficient working. In the time of King John the right of working for tin was vested wholly in the king, in his capacity of Earl of Cornwall; the mines being farmed or leased to Jews, who seem to have paid but a small sum annually to the king. John granted a few immunities and privileges to the miners, as a means of developing the resources; but the disturbances of the two following reigns caused the mines to be neglected. Under these circumstances a few Cornish gentlemen succeeded in obtaining a charter and grants, by virtue of which they might establish a court of judicature and a kind of parliament, manage and decide all mining disputes, and collect a toll or due of one-fifteenth of all the tin raised. The tin-grounds were at the same time bounded or separated into portions, as an encouragement to the labouring tinner to search for tin, by acquiring a property in the lands where he might discover it; and for the better promotion of tin-working in waste and uninclosed grounds, every tinner had liberty to labour in searching for tin. When he had discovered a 'lode,' or vein, and had given due notice to the Stannary Court, or Mining Parliament, he marked out the ground in which he chose to pursue his discovery, by digging a small pit at each angle of the boundary; by which means he acquired a right, in all future workings in that ground, either to work himself, or to set others to work for him, reserving to the lord of the soil one-fifteenth part of all tin raised therein. The boundary-pits were to be renewed every year, by cutting the turf and clearing up the dirt and rubbish which fell into them, in order that the range of each man's privileges should be strictly defined. As a return for all these privileges, the earls of Cornwall were to receive four shillings for every hundredweight of white tin raised; a rate of duty six times as great as that paid by the miners of Devonshire, who did not receive equal privileges. In order the better to secure the payment of this tax, it was agreed that all tin should be brought to places purposely appointed by the earl, there to be weighed and kept till the earl's dues were paid.

The above regulations began to be regarded as a kind of mining charter. In the 33rd of Edward I. the charter was confirmed; and the miners had the liberty of selling each man his own tin how he pleased, unless the king required to purchase it himself. This charter formed the basis for other arrangements, which were made the subjects of local enactment in the reigns of Edward III., Richard II., Edward IV., Edward VI., Mary, and Elizabeth. Some of these regulations had for their object the division of the Cornish tinners, who had before been regarded as one body, into four parts, named from the places of the principal tin-workings at that time, Fowey Moor, Trewarnheyl, Blackmoor, and Penrith. One general warden was constituted to do justice in law and equity, with an appeal from his decision to the Duke of Cornwall in Council only, or, in lieu thereof, to the Crown. The Lord Warden appointed a Vice-Warden to determine all stannary disputes every month (the word 'stannary' alluding to all matters connected with the tin-mines, from the Latin name for tin, "stannum"). He constituted also four stewards, one for each of the stannary precincts, who held their court every three weeks, and decided by juries of six persons; with an appeal reserved to the Vice-Warden, thence to the Lord Warden, and lastly to the Lords of the Council.

In the reign of Henry VII. a circumstance occurred which for a time disturbed the operation of these laws. The Duke of Cornwall made certain ordinances relating to the stannaries, which the tinners refused to observe; and as they indulged themselves in irregularities not consistent with their charter, the king declared it forfeited. On their submission, however, he granted a new charter, in which he restored all their former privileges; and enlarged them with this important addition, that no law relating to the tinners should be enacted without the consent of twenty-four gentlemen-tinners, six to be chosen by a mayor and council in each of the stannary divisions. This charter was confirmed by Elizabeth; and it being found inconvenient that the consent of the whole twenty-four should be required, it was declared that the consent of sixteen stannators, or members of the stannary parliament, should be sufficient to enact any law. Under the operation of this rule, when any new difficulties occurred, or when new laws became necessary for the better direction of the tinners and their proceedings, or when a more explicit declaration and enforcement of the old laws became necessary, the Lord Warden, by commission from the Duke of Cornwall or from the Crown, issued his precept to the four principal towns of the stannary districts, viz. Launceston for Fowey Moor, Lostwithiel for Blackmoor, Truro for Trewarnheyl, and Helston for Penrith; each town choosing six

members, and the whole twenty-four so chosen, called stannators, constituting the parliament of tinners. In the reign of Charles II. an extension took place, by the occasional choice of six 'assistant stannators' from each district, in cases of importance.

A few changes have been made since that time, and the present regulations may be stated nearly as follows:—The Duke of Cornwall has his Chancellor, Attorney-General, Solicitor-General, and Exchequer Court; but the tin-miners and their affairs are under the peculiar jurisdiction of the Stannary Courts, headed by the Lord Warden and the Vice-Warden. The miners claim to be free from all jurisdiction but that of the Stannary Courts, except in cases affecting land, life, or limb. The Vice-Warden's Court is held once a month, and is a court of equity for all matters relating to the tin-mines and trade; no writ of error lies to the Court at Westminster, but there is an appeal to the Lord Warden, and from him to the Duke in Council. Issues are frequently directed by the Vice-Warden to be tried in the Stannary Courts, which are held, at the end of every three weeks, before the Steward of each of the four stannaries or mining districts. In these courts all civil actions, in which either plaintiff or defendant is a privileged tinner, are tried before the Steward and a jury: an appeal lying from these courts to the Vice-Warden, and from him to the higher authorities. The twenty-four stannators, chosen by the four districts, do not take cognizance of the execution of the laws on the trial of causes; their duties being legislative or parliamentary, and not executive. The stannary laws are revised, or new ones enacted, by this body, in conjunction with the Duke and his Council, the stannators being gentlemen of property in the mining districts. The holding of a Stannary Parliament is a rare occurrence, the mining-laws being clearly explained and well understood by those who have to act under them; indeed it is said that a century has nearly elapsed since such an assemblage took place. The laws are embodied in a code, and have been often published. The ancient records of the stannaries were kept at Lostwithiel, till they were burned in the great civil war of Charles I., in 1644, by the parliamentary army.

We will next glance at the mining-laws of Derbyshire. This county presents a striking contrast to Cornwall, in respect to the comparative desertion of the mines; for it is supposed the annual produce of the lead-mines of the first-named county is not one-sixth of what it was fifty years ago. There are two-hundred and twenty Derbyshire lead-mines, of which several, now exhausted, form the celebrated caves of that county. Some of these mines can be proved to have been worked by the Saxons, while others can be traced as far back as the time of the Romans. The termination of the working of many of the mines has been occasioned by the circumstance that, as the veins of ore become less in dimensions as they descend, they are at length too little valuable to render further working profitable.

The mining-laws at present in force in Derbyshire are said to apply only to that part of the county known as the King's Field, or hundreds of High Peak and Wirksworth, extending to Crick; and that within this limit the mining rights of the Crown are confined to such land and manors as belonged to the Duke of Lancaster. In the King's Field certain officers are appointed, called 'bar-masters,' who hold mineral courts, at which a jury of twenty-four men decide all questions or disputes regarding the *cope*, or duties payable to the king or his man, or lessee, and who have also a power of determining all disputes or questions, and, in certain cases, of enforcing the payment of debts incurred in the working of mines.

Many of the laws originated in the very infancy of the system, when the mines were worked by manual labour only, and from this circumstance they seem singularly primitive and rude. Upon a person finding a vein of ore, the laws require him to make a cross upon the ground as a mark of possession, giving notice at the same time to the bar-master, who attends and receives a measure or dish of ore, being the first produce of the mine. This appears to be a preliminary condition for allowing him to proceed in working his *meer*, or measure of twenty-nine yards in length of vein; the bar-master at the same time taking possession of the next half-meer (fourteen yards and a half) for the king. This half-meer, after being valued by experienced persons, is sold to the adjoining meer-holder. If the vein promise well, applications are made for the next meer, the same form being observed; and, when there are a number of partners concerned in working the vein, they are termed 'grove-fellows.' The mining laws require not merely the discovery of a vein of ore (of which there are many that have little or no lead), but that has been worked so far as to produce the 'king's dish.' This king's dish alludes to the duty or share paid to the king. A dish of ore, in the Low Peak district, is a rectangular box, twenty-eight inches long, six inches wide, and four inches deep, holding fourteen Winchester pints: the High Peak dish is somewhat larger, holding sixteen pints; but in either case every twenty-fifth dish belongs to the king, and is considered his share of the produce. A small portion also goes as tithe, and another small portion to the lord of the manor.

The mode pursued in working the first mines was what is termed 'open-work;' that is, the surface-soil was first removed, and the ore then dug out with mattocks, picks, hammers, and wedges. *Stowses* or windlasses were then erected over the open gaps, by which the refuse earth was drawn to the surface. A number of *meers* was thus worked in a parallel line, strict laws being made and enforced by the mining courts to prevent the occupiers of the soil from levelling or meddling with these dangerous and unsightly apertures. As the mines, however, increased in depth, horse-gins were erected for drawing the ore and water; and the mines or meers became consolidated by the property of them being united, the meers being also connected below the ore and vein, and the produce being drawn up vertical shafts. Still the old laws relating to the stowse had to be attended to; for by these laws each meer was to have a stowse to itself, and this stowse was to be used, once in three weeks at least, to draw up the ore from the meer. But when the meers became consolidated into larger property, and the shafts sunk, the stowses were no longer wanted; yet a model of a stowse, or sham drawing-apparatus, was put over the meer, as a means of keeping rightful possession of the meers on a consolidated mine. A writer in the 'Mining Review' observes that even now this subterfuge "is so rigidly enforced, that a mine on which steam-engines and gins are erected is not held to be legally occupied, except one of those pigmy memorials of the antient mode of drawing ore is constantly kept 'in sight of all men.' The mining laws punish by fines all persons detected removing the bar-master's stowses, even if placed in the middle of a cultivated field, a common, or a fence-wall. These models, to be legal, must have no nails in their structure, as primitively made. The bar-master charges a small sum for these shams, and the miners are obliged to be particular in replacing them when broken or destroyed." This is a very curious instance of what frequently meets our attention, viz., the retention of the letter of the law, when its spirit has evaporated.